CHAPTER V

CONCLUSIONS

Inflow performance data at different depletion stages were generated for a vertical oil well producing in a solution-gas drive reservoir from a reservoir simulator, ECLIPSE. These reservoirs encompass a wide range of depletion, reservoir properties, PVT, and relative permeability characteristics. In order to obtain inflow performance relationship, modified isochronal tests were simulated during the simulation runs. The exponent n and J of Fetkovich equation was evaluated. The values of n and J from all the tests were converted into dimensionless variables n/n_b and J/J_b and plotted as a function of dimensionless p/p_b which leads to the following conclusions:

1. The exponent (n) for solution-gas-drive reservoir determined from a log $\Delta(p^2)$ vs. log q plot was found to lie between 0.973 and 1.558.

2. The changing of exponent (n) and PI coefficient (J) is directly related to gas production and pressure depletion in each stage.

3. A second-order polynomial was found to be the most suitable empirical correlation to correlate dimensionless n/n_b with dimensionless pressure and can be expressed as

$$\frac{n}{n_b} = \frac{2.8089 + 81.5803\left(\dfrac{p_r}{p_b}\right)}{1 + 86.0795\left(\dfrac{p_r}{p_b}\right) - 2.7669\left(\dfrac{p_r}{p_b}\right)^2}$$

4. A second order polynomial was found to be the most suitable empirical correlation to correlate dimensionless J/J_b with dimensionless pressure and can be expressed as

$$\frac{J}{J_b} = \frac{2.6687 + 2.9247\left(\dfrac{p_r}{p_b}\right)}{1 + 11.2741\left(\dfrac{p_r}{p_b}\right) - 7.7311\left(\dfrac{p_r}{p_b}\right)^2}$$

5. The value of exponent (n) plotted as a function of reservoir pressure generally exhibits the same shape except following cases:

    1. p_b = 1,500 psia, permeability = 50 md

    2. p_b = 2,000 psia, permeability = 50 md

    3. p_b = 2,500 psia, permeability = 50 md

6. The value of PI (J) plotted as a function of reservoir pressure generally exhibits the same shape except for the following cases:

    1. p_b = 1,500 psia, permeability = 50 md

    2. p_b = 2,000 psia, permeability = 50 md

    3. p_b = 2,500 psia, permeability = 50 md

7. The empirical relationships of n/n_b and J/J_b as a function of dimensionless pressure determining in this study may not provide a good result when the permeability of the reservoir is low.

The result from this study should be useful in predicting future inflow performance relationship of an oil well drilled in a solution-gas drive reservoir.